PROPOSED SCOPE OF WORK
SPECIFIC AREA HYDROGEOLOGIC EVALUATION

Task 1-Assemble and Supplement Geologic Data - A number of geologic maps are available in most areas. Such maps show rock types, geologic contacts, faults, lineaments, fracture trends, and other features. This information is important in terms of preferential groundwater flow paths, favorable well sites, well interference, and groundwater quality. Substantial geologic information is available from the U.S. Geologic Survey, California Division of Mines and Geology, university theses and dissertations, and consultant reports. Mapping for some specific subdivisions is also available. This would be assembled and data gaps identified. Aerial photos would be obtained and reviewed and mapping of major lineaments would be done to fill in the gaps in specific areas. Fracture trends would also be determined and plotted on maps to fill in gaps.

Task 2-Well Yields and Pumpage - Completion reports for individual wells would be used to prepare graphs showing well depths and air-test yields in the study area. For water system wells, construction data, annual pumpage, and sustainable well yields would be summarized. Total well pumpage would also be estimated for the study area.

Task 3-Water-Level Measurements - Water levels will be measured in

as many wells as feasible during at least two periods. One would be during the spring and the other during the fall. Wells would be selected for which driller's reports are available, and to provide geographic coverage. Electric sounders will be used for measuring the water levels. A GPS unit would be used to precisely locate the wells and determine the elevation of the measuring point. Water-level elevations will be determined and plotted. Water-level elevation contours and direction of groundwater flow maps will then be prepared for the Summer and Fall. In specific developed areas where both shallow and deep wells are present, separate maps may be prepared for the shallow and deep groundwater. In addition to these measurements, routine water-level measurements will be made in an estimated 30 wells to determine seasonal water level changes. For these sites, both shallow and deep wells (if available) will be selected for monthly water-level measurements, where access is available. These will continue over a period of up to two years. Water-level hydrographs would be prepared for these wells. This will provide some of the best information on the extent and timing of recharge to the shallow and deep groundwater.

Task 4-Watershed Delineation and Water Budget - Recharge to groundwater in the fracture rock comes from precipitation. Watersheds can be delineated that are tributary to a well or groups of wells. In order to evaluate recharge, watersheds are mapped based on land

surface drainage divides. It is expected that groups of private wells (high density) and locations of water purveyors systems and wells would be highly utilized in delineating tributary watersheds to be evaluated. Long-term isohyetal maps for precipitation are already available. Evapotranspiration will be determined for the various delineated watersheds, based on already developed values for various types of vegetation. These are available primarily from studies of the U.S. Forest Service and the University of California. Streamflow records will be evaluated to compare precipitation, evapotranspiration, and runoff in the area. In general, groundwater pumpage in the hardrock is based on pumping water that would have otherwise been used by plants, lost to evaporation, or run off as streamflow. This enables one to develop reasonable values of potential groundwater recharge various watersheds. Potential groundwater recharge would then be determined in developed watersheds, and this would be compared to the existing pumpage. The potential recharge estimates will be extremely useful in evaluating the carrying capacity of specific parts of the study area.

Task 5-Develop understanding of hydraulic connection between streamflow and groundwater - Water-level elevation maps will be used to evaluate the direction of groundwater flow relative to the primary streams. Also, stream channel elevations would be compared to groundwater level elevations, to evaluate the relation between

streamflow and groundwater. Locations of groundwater recharge from streamflow and groundwater discharge to streams would be determined.

Task 6-Delineation of water quality problem areas - Several groundwater quality problems have been identified in parts of the Sierra Nevada. These problems include salt water, acidic groundwater, and high concentrations of manganese, iron, arsenic, uranium, fluoride, and hydrogen sulfide in some areas. First, available data for water systems and private wells would be summarized and plotted. Second, a water sampling program for analyses of key constituents to fill in data gaps would be developed and carried out. Maps would then be prepared showing approximate problem areas for constituents of concern.

Task 7-Meeting and program reports - Meetings will be held on a quarterly basis, discussing study progress, findings, important data, and draft illustrations, as they become available.

Task 8-Prepare final report - A draft technical report will be prepared, presenting the basic data and interpretation, maps, illustrations, and appendices, as well as recommendations for future studies and monitoring programs. This report will be reviewed by interested parties, the comments addressed, and the final report prepared.

## ESTIMATED AVERAGE COSTS PER STUDY AREA

| Task | Approximate Cost ($) |
|---|---|
| 1 | 10,000 |
| 2 | 15,000 |
| 3 | 35,000 |
| 4 | 10,000 |
| 5 | 8,000 |
| 6 | 18,000 |
| 7 | 12,000 |
| 8 | 18,000 |
| Total | 126,000 |

## CANDIDATE AREAS

| | |
|---|---|
| Fresno County | Dunlap-Miramonte |
| | Squaw Valley |
| | Auberry |
| Tulare County | Three Rivers |
| | Springville |
| | California Hot Springs |
| | Camp Nelson |
| Kern County | Glennville-Linns Valley |
| | Kernville |